

**THAT WHICH IS CLAIMED IS:**

1. A method of manufacturing a diode subassembly used in rectifiers of engine-driven generators, wherein the assembly includes a diode cup, and semiconductor diode die and diode lead fitted  
5 therein, the method comprising the step of:

reflow soldering a semiconductor diode die and diode lead within a diode cup in an argon/hydrogen atmosphere.

2. A method according to Claim 1, and further comprising the step of inserting solder preforms between the diode cup and semiconductor diode die and the diode lead and semiconductor diode die  
5 before reflow soldering.

3. A method according to Claim 1, and further comprising the step of reflow soldering within an argon/hydrogen atmosphere of about 80 percent argon and 20 percent hydrogen.

4. A method according to Claim 1, and further comprising the step of reflow soldering at a temperature up to about 400 degrees C.

5. A method according to Claim 1, and further comprising the step of reflow soldering under pressure to aid in forcing the semiconductor diode die, diode cup and diode lead together.

6. A method according to Claim 1, and further comprising the step of reflow soldering at a pressure up to about 60 pounds per square inch.

7. A method according to Claim 1, and further comprising the step of reflow soldering with a lead-tin-indium solder.

8. A method according to Claim 1, wherein after the step of reflow soldering, comprises the step of sealing the diode cup, semiconductor diode die and diode lead with a sealant.

9. A method according to Claim 8, wherein the step of sealing comprises the step of sealing with an epoxy.

10. A method according to Claim 1, and further comprising the step of inserting solder preforms between the diode cup and semiconductor diode die and the diode lead and semiconductor diode die.

11. A method of manufacturing a diode subassembly used in rectifiers of engine-driven generators, wherein the diode assembly includes a diode cup and semiconductor diode die and diode lead fitted  
5 therein, comprising the step of:

positioning a diode cup within a diode boat having a plurality of soldering positions for holding diode cups therein;

positioning a lead loader having a removable  
10 lead holder that holds diode leads therein over the diode boat such that the diode leads are aligned with respective diode cups;

sliding the lead holder from the lead loader such that the diode leads fall into the center cups  
15 which also have the semiconductor diode die positioned therein;

inserting the diode boat within a furnace;

soldering the semiconductor diode die and  
diode lead within the lower diode cup in an  
20 argon/hydrogen atmosphere of the furnace.

12. A method according to Claim 11, and  
further comprising the step of reflow soldering within  
an argon/hydrogen atmosphere of about 80 percent argon  
and 20 percent hydrogen.

13. A method according to Claim 11, and  
further comprising the step of reflow soldering at a  
temperature up to about 400 degrees C.

14. A method according to Claim 11, and  
further comprising the step of reflow soldering under  
pressure to aid in forcing the semiconductor diode die,  
center diode cup together.

15. A method according to Claim 11, and  
further comprising the step of reflow soldering at a  
pressure up to about 60 pounds per square inch.

16. A method according to Claim 11, and  
further comprising the step of reflow soldering with a  
lead-tin-indium solder.

17. A method according to Claim 11, wherein  
after the step of reflow soldering, the method  
comprises the step of sealing the cup, semiconductor  
diode die and diode lead with a sealant.

18. A method according to Claim 11, wherein  
the step of sealing comprises the step of sealing with  
an epoxy.

19. A method according to Claim 11, and further comprising the step of inserting solder preforms between the diode cup and semiconductor diode die and between the diode lead and semiconductor diode  
5 die.

20. A method according to Claim 11, and further comprising the step of preheating the furnace to ensure heating of edge portions of the diode boat.

21. A method of manufacturing a diode subassembly used in rectifiers of engine-driven generators, wherein the diode assembly includes a diode cup, semiconductor diode die, and diode lead fitted  
5 therein, comprising the step of:

positioning a diode cup having an unsoldered semiconductor diode die positioned therein within a soldering position within a die boat having a plurality of soldering positions for holding diode cups therein,  
10 wherein a solder preform is positioned between the diode cup and semiconductor diode die and a solder preform is positioned over the semiconductor die;

positioning a lead loader having a removable lead holder that holds diode leads therein over the  
15 diode boat such that the diode leads are aligned with respective diode cups;

removing the lead holder from the lead loader such that the diode leads fall into the center cups wherein a solder preform is positioned between the  
20 diode lead and the semiconductor diode die;

inserting the diode boat within a furnace;  
and

reflow soldering the semiconductor diode die and diode lead within the lower diode cup.

22. A method according to Claim 21, and further comprising the step of reflow soldering within an argon/hydrogen atmosphere of the furnace.

23. A method according to Claim 22, and further comprising the step of reflow soldering within an argon/hydrogen atmosphere of about 80 percent argon and 20 percent hydrogen.

24. A method according to Claim 21, and further comprising the step of reflow soldering at a temperature up to about 400 degrees C.

25. A method according to Claim 21, and further comprising the step of reflow soldering under pressure to aid in forcing the semiconductor diode die, center diode cup together.

26. A method according to Claim 21, and further comprising the step of reflow soldering at a pressure up to about 60 pounds per square inch.

27. A method according to Claim 21, and further comprising the step of reflow soldering with a lead-tin-indium solder.

28. A method according to Claim 21, wherein after the step of reflow soldering, the method comprising the step of sealing the cup, semiconductor die and diode lead with a sealant.

29. A method according to Claim 21, wherein the step of sealing comprises the step of sealing with an epoxy.

30. A method according to Claim 21, and further comprising the step of inserting solder preforms between the diode cup and semiconductor diode die and the diode lead and semiconductor diode die.

31. A method according to Claim 21, wherein the diode boat comprises a lower boat member having diode retaining orifices in which diode cups are inserted, and an upper retaining plate that covers the  
5 lower boat member and having orifices through diode boats can be dropped into the diode cups.